REMARKS

In the Final Office Action, the Examiner rejected claims 1-27 as obvious (35 U.S.C. §103) over Tanaka (U.S. Patent No. 5,542,064) in view of Arnon (U.S. Patent No. 6,493,796 B1).

Applicants amended claims 1, 4, 8, 10, 13, 17, 19, 22, and 26 to further distinguish over the cited art. Applicants submit that the claims, including amended claims, are patentable for the reasons discussed herein and traverse the prior art rejections for the following reasons.

Amended independent claims 1, 10, and 19 concern accessing a data set from one of two storage devices, each including a copy of the data set. These claims require: maintaining a flag for each storage device indicating whether a previous access attempt of the data set from the storage device failed; maintaining a data level for each of the plurality of data sets in each storage device indicating a number of times the data set has been updated; receiving a request to one data set; selecting the storage device having a higher data level if the data levels are not equal; selecting the storage device having the flag indicating that no previous access attempt failed if the flag for the other storage device indicates that one previous access attempt of the data set from the storage device failed and if the data levels are equal; and accessing the data set from the selected storage device.

Applicants amended the independent claims 1, 10, and 19 to further require maintaining a data level for each of the plurality of data sets in each storage device indicating a number of times the data set has been updated; receiving a request to one data set; selecting the storage device having a higher data level if the data levels are not equal. The limitation requiring selecting the storage device having the flag indicating that no previous access attempt failed if the flag for the other storage device indicates that one previous access attempt of the data set from the storage device failed to further require selecting the storage device if the data levels are equal.

The pre-amended independent claims 1, 10, and 19 did not recite the added data level limitations. However, the pre-amended claim 8 mentions the data level and the Examiner cited col. 13, lines 59-62 of Tanaka as teaching a data level with respect to claim 8. (Final Office

Action, pg. 8) Applicants submit that this cited col. 13 does not teach or suggest the added claim requirements.

The cited col. 13 of Tanaka mentions that the multiplicity of data and its history can be updated to be processed inside the apparatus by a simple user operation. Tanaka mentions that the multiplicity is the number of instances of identical data, where the number of disk drives should be larger than the multiplicity. (Tanaka, col. 5, line 38 to col. 6, line 5)

Although Tanaka mentions updating the number (multiplicity of identical data, nowhere in the cited Tanaka is there any teaching, suggestion or mention of maintaining a data level for each of the plurality of data sets in each storage device indicating a number of times the data set has been updated and selecting the storage device having a higher data level if the data levels are not equal, and further selecting the storage device having the flag indicating that no previous access attempt failed if the flag for the other storage device indicates that one previous access attempt of the data set from the storage device failed and if the data levels are equal.

Nowhere does the cited col. 13 of Tanaka anywhere teach having a data level for each of a plurality of data sets in the two storage devices which indicates a number of times the data sets in the storage devices have been updated. Instead, the cited col. 13 only mentions updating identical data.

Accordingly, the Examiner has not cited any art that teaches or suggest the added claim requirements.

In the Final Office Action, the Examiner cited col. 2, lines 43-46 and col. 10, lines 37-44, FIG. 5 and FIG. 9 of Tanaka as teaching the claim requirement of maintaining a flag for each storage device indicating whether a previous access attempt of the data set from the storage device failed. these claim requirements. (Final Office Action, pg. 2) Applicants traverse.

The cited col. 2 discusses a goal to provide a method for accessing identical data in a secondary storage device having storage units to make it easy to recover data in the case of a failure. Although the cited col. 2 discusses accessing identical data, nowhere does the cited col. 2 anywhere teach the claim requirement, that in response to an access request, a selection is made of one of two storage devices having the data set and whose flag indicates that no previous access

failed when the flag for the other storage device indicates that a previous access failed. Further, nowhere does this cited col. 2 anywhere teach, suggest or mention the added requirement that the storage device having the flag indicating no previous access if the data levels are equal, where the data levels indicate a number of times the data set in the storage devices was accessed.

The cited col. 10 and FIG. 9 of Tanaka mentions that when a failure occurs in any of the disk drives 16-1 to 16-n and drive processor 17-1 to 17-n, a flag indicating that the failed disk cannot be used is set in an area also indicating a number of I/O commands to process for the disk drive, shown in FIG. 5, to forbid use of the failed disk drive.

Although Tanaka discusses the use of flags with disk drives indicating whether a drive failed, nowhere does the cited col. 10 of Tanaka teach or suggest the claim requirement that a flag is maintained for two storage devices that have the same data set and that in response to an access request, the storage device having the flag indicating that no previous access attempt failed is selected if the flag for the other storage device indicates that one previous attempt failed. Tanaka mentions that its flag is used to prevent someone from accessing a failed drive, but nowhere suggests the claimed use of the flag to select one of two devices having the same data set to access. Further, nowhere does this cited col. 10 anywhere teach, suggest or mention the added requirement that the storage device having the flag indicating no previous access if the data levels are equal, where the data levels indicate a number of times the data set in the storage devices was accessed.

The Examiner further cited col. 14, lines 19-26 of Arnon with respect to the claim requirement that two storage devices include a copy of the same data set and that a flag is maintained for each storage device. (Final Office Action, pgs. 2-3) The cited Arnon mentions flags for each storage device indicating the state of the device as on-line, off-line, or pending off-line. Nowhere does the cited Arnon teach or suggest that in response to receiving an access request, flags of storage devices having the same data set are considered and the storage device having a flag indicating no previous access failure is selected when the other storage device flag indicates a previous access failure. Further, nowhere does this cited Arnon anywhere teach, suggest or mention the added requirement of selecting storage device having the flag indicating

no previous access if the data levels are equal, where the data levels indicate a number of times the data set in the storage devices was accessed.

The Examiner also referenced the table discussed in Arnon accessible to the storage system. (Final Office Action, pg. 2) The cited Arnon mentions that a table may be stored in other locations accessible to the storage system. However, nowhere does the cited Arnon mention that the storage devices for which flags are maintained include the same data set that may be accessed.

Thus, although both Tanaka and Arnon mention flags with storage devices indicating a state of the storage device, such as failed, nowhere does the cited Tanaka nor Arnon teach or suggest, alone or in combination the use of such flags with storage devices having a copy of the same data set, and then considering such flags when selecting one storage device to use for the access.

Further, nowhere do these cited references anywhere teach, suggest or mention the added requirement of maintaining a data level for each of the plurality of data sets in each storage device indicating a number of times the data set has been updated and selecting the storage device having the flag indicating that no previous access attempt failed if the flag for the other storage device indicates that one previous access attempt of the data set from the storage device failed and if the data levels are equal. Yet further, nowhere do these cited references teach the claim requirement that the storage device having a flag indicating no previous access failure is selected when the other storage device flag indicates a previous access failure. Thus, even if the references may be combined, they still do not teach or suggest all the claim requirements.

Applicants further submit that nowhere do the cited references teach or suggest the claim requirement, that in response to an access request, a selection is made of one of two storage devices having the data set whose flag indicates that no previous access failed when the flag for the other storage device indicates that a previous access failed. Although the cited references discuss flags indicating the state of a storage device, nowhere do the cited references, alone or in combination, teach or suggest that in response to receiving an access request, the flags are

considered such that the storage device having a flag indicating no failure is selected when the other storage device flag indicates a failure and if the data levels are equal.

For instance, col. 12, lines 40-50 of Tanaka discuss that when one disk drive fails, the data may be recovered from another disk drive. However, this cited section also nowhere teaches that the flags of Tanaka indicating drive failure are checked for two storage devices having the copy of the data to determine from which device to access the data.

Accordingly, claims 1, 10, and 19 are patentable over the cited art because the cited art, alone and in combination, does not teach or suggest all the claim requirements.

Claims 2-9, 11-18, and 20-27 are patentable over the cited combination of art because they depend from claims 1, 10, and 19, which are patentable over the cited art for the reasons discussed above, and because they add requirements that in combination with the base and intervening claims from which they depend, further distinguish over the cited combination. Moreover, claims 2, 4-9, 11, 13-18, 20, and 22-27 provide additional grounds of patentability over the cited art.

Claims 2, 11, and 20 depend from claims 1, 10, and 19, respectively, and further require using a selection criteria to access one of the first and second storage devices that is unrelated to a value of the flag if the flags for both storage devices have the same value. In the Final Office Action, the Examiner cited col. 9, lines 47-48 of Tanaka as teaching the additional requirement of these claims. (Final Office Action, pg. 6). Applicants traverse.

The cited col. 9 mentions that if the number of selected disk drives cannot satisfy the multiplicity, then supplements are selected from disk drives having data satisfying the conditions. Tanaka mentions that the multiplicity is the number of instances of identical data, where the number of disk drives should be larger than the multiplicity. (Tanaka, col. 5, line 38 to col. 6, line 5)

In the previous response, Applicants explained that nowhere does the cited col. 9 anywhere teach or suggest a selection criteria to access a copy of a data set from one of two storage devices that is unrelated to the flag for each device indicating whether a previous access attempt to the device failed. Further, the cited col. 9 does not teach the claim requirement of

selecting a device in response to an access request for a data set having copies on two different

storage device. Instead, the cited col. 9 concerns ensuring there are enough disk drives or other

areas to write multiple instances of identical data. Nowhere does the cited col. 9 anywhere teach

selecting one of two storage devices for an access based on the flag value and another selection

criteria unrelated to the flag.

In the Final Office Action, the Examiner did not respond to the above arguments with

respect to claims 2, 11, and 20, nor explain where the cited Tanaka teaches or suggests the claim

requirement of selecting one of two storage devices for an access based on the flag value and

another selection criteria unrelated to the flag.

Accordingly, claims 2, 11, and 20 provide additional grounds of patentability over the

cited art because the cited combination does not teach or suggest the additional claim

requirements alone or in combination with base and any intervening claims.

Amended claims 4, 13, and 22 depend from claims 1, 10, and 19 and further require that a

flag and data level are maintained for each data set in the first and second storage devices and

wherein the first and second storage devices have the same data sets.

Applicants amended these claims to further require maintaining the data level for each

data set.

In the Final Office Action, the Examiner cited col. 2, lines 26-29 of Tanaka as teaching

the additional requirements of these claims. (Final Office Action, pg. 7). Applicants traverse.

The cited col. 2 mentions writing identical data to enhance I/O throughput of a secondary

storage device having a plurality of storage units. In the previous response, Applicants

explained that nowhere does this cited col. 2 anywhere teach or suggest providing a flag for each

data set in the first and second storage devices having the same data sets, where the flag for each

data set indicates whether a previous access to the data set failed. Instead, the cited col. 2 just

mentions how identical data can be copied to different units in a storage device.

In the Final Office Action, the Examiner did not respond to the above arguments with

respect to claims 4, 13, and 22, nor explain where the cited Tanaka teaches or suggests the claim

requirement of providing a flag for each data set in the first and second storage devices having

the same data sets, where the flag for each data set indicates whether a previous access to the data set failed.

Accordingly, claims 4, 13, and 22 provide additional grounds of patentability over the cited art because the cited combination does not teach or suggest the additional claim requirements alone or in combination with base and any intervening claims.

Claims 5, 14, and 23 depend from claims 1, 10, and 19 and further require: accessing the data set from one of a third and fourth storage devices if the data set is in one of the third and fourth storage devices, wherein the steps of selecting one of the first and second storage devices and accessing the data from one of the first and second storage devices occurs if the data set is not in one of the third and fourth storage devices; copying the data set from the first storage device to the third storage device when accessing the data set from the first storage device; and copying the data set from the second storage device to the fourth storage device when accessing the data set from the first storage device.

In the response to arguments in the Final Office Action, the Examiner cited col. 9, lines 37-49 of Tanaka. (Final Office Action, pg. 3) The cited col. 9 discusses how a judgement is made as to whether the number of selected disk drives can satisfy the multiplicity. The multiplicity refers to the writing of identical data to selected storage units. (Tanaka, col. 2, lines 61-67) The cited col. 9 further discusses how disk drives can be selected for the "multiplicity" or to receive the identical data. If the number of selected disk drives cannot satisfy the multiple writings, then supplements are selected from disk drives satisfying the condition.

Although the cited Tanaka discusses writing identical data to different disk drives, nowhere does the cited Tanaka anywhere teach or suggest the claim requirement that a data set is copied from a first to third storage devices or from a second to fourth storage devices when the data is accessed from the first or second storage devices.

Accordingly, claims 5, 14, and 23 provide additional grounds of patentability over the cited art because the cited combination does not teach or suggest the additional claim requirements alone or in combination with base and any intervening claims.

With respect to claims 6, 15, and 24, the Examiner repeated his findings made in the Previous Office Action and cited col. 13, lines 48-56 as teaching the claim requirement of recalling the data set from the third storage device if the scheduled write operation has not yet copied the requested data set to the first storage device, wherein the steps of selecting one of the first and second storage devices to access the data set and accessing the data set occurs if the scheduled write operation of the data set to the first storage device completed. (Final Office Action, pg. 7) Applicants traverse.

The cited col. 13 mentions that keeping the CPU waiting for input commands through some disk drives can be eliminated to improve performance. Col. 13 further mentions that data to be recovered at time of recovery of a failure in any disk drive is obtained from identical data multiply copied in some disk drives so that the recovery can be written at any time. In the previous response, Applicants explained that nowhere does this cited col. 13 anywhere teach or suggest the claim requirement of recalling a data set from a third storage device if a scheduled write from the third to first storage device has not yet copied data, and that selecting one of the first and second storage devices to access the data set occurs if the scheduled write has completed.

In the Final Office Action, the Examiner did not respond to the above arguments with respect to claims 6, 15, and 24, nor explain where the cited Tanaka teaches or suggests the claimed sequence of events anywhere taught or remotely suggested in the cited col. 13.

Accordingly, claims 6, 15, and 24 provide additional grounds of patentability over the cited art because the cited combination does not teach or suggest the additional claim requirements alone or in combination with base and any intervening claims.

Claims 7, 16, and 25 depend from claims 6, 15, and 24 and further require randomly selecting one of the first and second storage devices from which to recall the data set if the requested data set has been copied to the first and second storage devices as a result of the scheduled write operation and if the flags for both storage devices have the same value.

The Examiner cited col. 13, lines 48-56 of Tanaka as teaching the additional requirements of these claims. (Final Office Action, pg. 7) Applicants traverse.

As discussed, the cited col. 13 mentions that data to be recovered at time of recovery of a failure in any disk drive is obtained from identical data multiply copied in some disk drives so that the recovery can be written at any time.

Nowhere does this cited col. 13 anywhere teach or remotely suggest that one of the first and second storage devices is randomly selected for the recall if the requested data set has been copied to the first and second storage devices and if the flags (indicating whether a previous access failed) have the same value. Nowhere does the cited col. 13 anywhere suggest this sequence of operations and determinations, i.e., randomly select if requested data copied and if flags have the same value.

Accordingly, claims 7, 16, and 25 provide additional grounds of patentability over the cited art because the cited combination does not teach or suggest the additional claim requirements alone or in combination with base and any intervening claims.

Amended claims 8, 17, and 26 depend from claims 5, 14, and 23 and further require further comprising determining whether the data set is in both the third and fourth storage devices, wherein accessing the data set from one of the third and fourth storage devices comprises accessing the data set from one of the third and fourth storage devices having the highest data level for the data set. The Examiner cited col. 13, lines 59-62 as teaching the additional requirements of these claims. (Final Office Action, pg. 8) Applicants traverse.

These claims were amended to remove the requirement that the data level is maintained for the data set in both the third and fourth storage devices indicating a version of the data set.

The cited col. 13 of Tanaka mentions that the addresses of data, the multiplicity of data and the history of data can be updated so as to be converted inside the apparatus by a simple user operation.

Nowhere does this cited col. 13 anywhere teach or suggest the claim requirement accessing the data set from one of the third and fourth storage devices having the highest data level for the data set. Instead, the cited col. 13 just mentions updating multiple instances of data, i.e., multiplicity of data.

Accordingly, claims 8, 17, and 26 provide additional grounds of patentability over the cited art because the cited combination does not teach or suggest the additional claim requirements alone or in combination with base and any intervening claims.

Claims 9, 18, and 26 depend from claims 8, 17, and 26 and further require randomly selecting one of the third and fourth storage devices from which to access the data set if the data levels of the data set at both the third and fourth storage devices have the same value. The Examiner cited col. 9, lines 47-48 as Tanaka teaching the additional requirements of these claims. (Final Office Action, pg. 8). Applicants traverse.

The cited col. 9 mentions that when the number of selected disk drives cannot satisfy the multiplicity, supplements are selected.

Nowhere does this cited col. 9 anywhere teach, suggest or mention the claim requirement of randomly selecting one of the third and fourth storage devices from which to access the data set if the data levels of the data set at both the third and fourth storage devices have the same value.

Accordingly, claims 9, 18, and 26 provide additional grounds of patentability over the cited art because the cited combination does not teach or suggest the additional claim requirements alone or in combination with base and any intervening claims.

Conclusion

For all the above reasons, Applicant submits that the pending claims 1-27 are patentable over the art of record. Applicants submit herewith the fee for a one month extension of time and the RCE. Nonetheless, should any additional fees be required, please charge Deposit Account No. 09-0466..

The attorney of record invites the Examiner to contact him at (310) 553-7977 if the

Examiner believes such contact would advance the prosecution of the case.

Dated: <u>December 5, 2003</u>   By:

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